

WHAT IS CLAIMED IS:

1        1.        A design method for a bus system equipped with  
2        a plurality of device units, a data bus on which said device  
3        units are connectible, a timing-signal supply source for  
4        supplying a timing signal to said device units through  
5        a timing-signal bus, a bus switch for connecting and  
6        disconnecting a signal between the device unit and said  
7        data bus, and a bus-switch control part for controlling  
8        the connecting and disconnecting operations of said bus  
9        switch,

10                said design method comprising:

11                a noise propagation computation step of  
12        computing, based on a cycle of said timing signal, a signal  
13        propagation delay in the device unit, signal propagation  
14        delays in said timing-signal bus and said data bus, and  
15        a setup time in the device unit or device connected on  
16        said data bus, timing at which, when the device unit is  
17        connected on said data bus being active, noise propagates  
18        to the remaining device units other than said connected  
19        device unit or to said device connected on said data bus;  
20        and

21                a connection timing computation step of  
22        computing, based on said timing computed in said noise  
23        propagation computation step, connection timing at which  
24        said device unit is connected on said data bus.

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1        2.            The design method as set forth in claim 1, wherein  
2        in said connection timing computation step said connection  
3        timing is computed by computing a delay time "b" needed  
4        for said bus switch to connect said device unit on said  
5        data bus after said device unit is connected on said  
6        timing-signal bus.

1        3.            The design method as set forth in claim 1,  
2        wherein:

3                    in said noise propagation computation step, a  
4        timing margin  $M \{= (T + g) - (a + b + c + d + e + f) -$   
5         $S\}$  between arrival of said noise at the device units other  
6        than the connected device unit or device connected to said  
7        data bus and start of said setup time is computed as  
8        propagation timing of said noise, based on cycle "T" of  
9        said timing signal, skew "a" from said timing-signal supply  
10       source to said bus switch control part, delay time "b"  
11       of said bus switch, signal propagation delay time "c"  
12       between said bus switch control part and said bus switch,  
13       operating delay time "d" of said bus switch, pulse width  
14       (time) "e" of said noise, propagation delay time "f" of  
15       said noise in said connected device unit and said data  
16       bus, skew "g" from said timing-signal supply source to  
17       the device units other than said connected device unit  
18       or device connected on said data bus, and setup time "S"  
19       in said bus system; and

20                    in said connection timing computation step, the

21 delay time "b" of said bus switch is computed so that said  
22 timing margin M is 0 or greater.

1 4. A bus system comprising:  
2 a plurality of device units;  
3 a data bus on which said device units are  
4 connectible;  
5 a timing-signal supply source for supplying a  
6 timing signal to said device units through a timing-signal  
7 bus, a bus switch for connecting and disconnecting a signal  
8 between the device unit and said data bus; and  
9 a bus-switch control part for controlling the  
10 connecting and disconnecting operations of said bus  
11 switch;  
12 wherein said bus-switch control part controls  
13 said bus switch so that the device unit is connected on  
14 said data bus after a delay time "b" of said bus switch  
15 from connection of said device unit with said timing-signal  
16 bus;  
17 and wherein, based on cycle "T" of said timing  
18 signal, skew "a" from said timing-signal supply source  
19 to said bus switch control part, the delay time "b" of  
20 said bus switch, signal propagation delay time "c" between  
21 said bus switch control part and said bus switch, operating  
22 delay time "d" of said bus switch, pulse width (time) "e"  
23 of noise caused when the device unit is connected on said  
24 data bus being active, propagation delay time "f" of said

25 noise in the device unit and said data bus, skew "g" from  
26 said timing-signal supply source to the device units other  
27 than the connected device unit or device connected on said  
28 data bus, and setup time "S" in said bus system, the delay  
29 time "b" of said bus switch is computed as a value such  
30 that a timing margin  $M \{= (T + g) - (a + b + c + d + e$   
31  $+ f) - S\}$  from arrival of said noise at the device units  
32 other than the connected device unit or said device to  
33 start of said setup time is 0 or greater.

1 5. A device unit connectible to a printed-circuit  
2 board equipped with a data bus, a timing-signal supply  
3 source, and a timing-signal bus connected to said  
4 timing-signal supply source, comprising:

5 a bus switch for connecting and disconnecting  
6 a signal between said device unit and said data bus; and

7 a bus-switch control part for controlling the  
8 connecting and disconnecting operations of said bus  
9 switch;

10 wherein said bus-switch control part controls  
11 said bus switch so that the device unit is connected on  
12 said data bus after a delay time "b" of said bus switch  
13 from connection of said device unit with said timing-signal  
14 bus;

15 and wherein, based on cycle "T" of said timing  
16 signal, skew "a" from said timing-signal supply source  
17 to said bus switch control part, the delay time "b" of

18      said bus switch, signal propagation delay time "c" between  
19      said bus switch control part and said bus switch, operating  
20      delay time "d" of said bus switch, pulse width (time) "e"  
21      of noise caused when the device unit is connected on said  
22      data bus being active, propagation delay time "f" of said  
23      noise in the device unit and said data bus, skew "g" from  
24      said timing-signal supply source to device units other  
25      than the connected device unit or device connected on said  
26      data bus, and setup time "S" in said bus system, the delay  
27      time "b" of said bus switch is computed as a value such  
28      that a timing margin  $M \{ = (T + g) - (a + b + c + d + e$   
29       $+ f) - S \}$  from arrival of said noise at the device units  
30      other than the connected device unit or said device to  
31      start of said setup time is 0 or greater.